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S2123 S2126 S2185 S2204 S2205 S2206 S2210  
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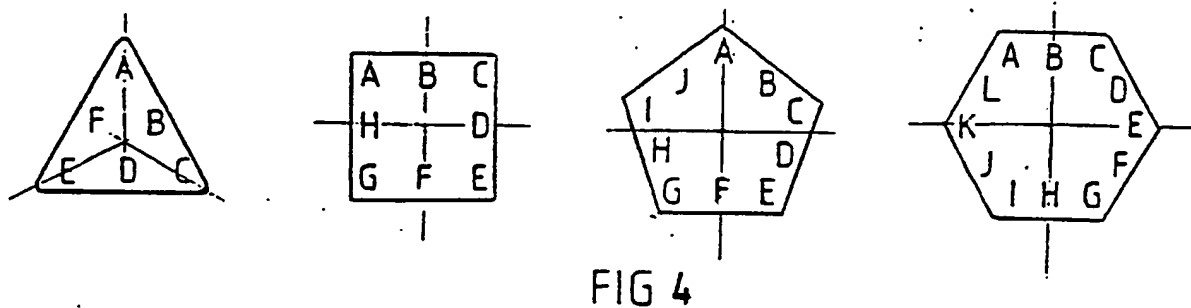
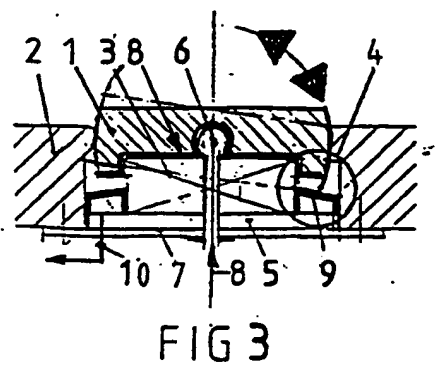
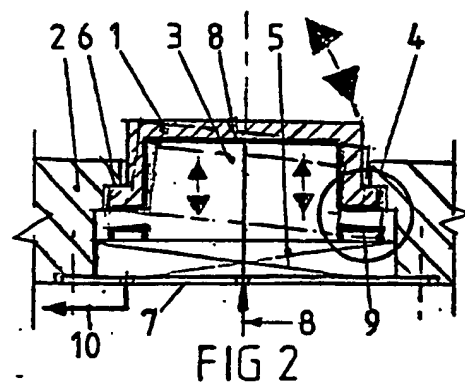
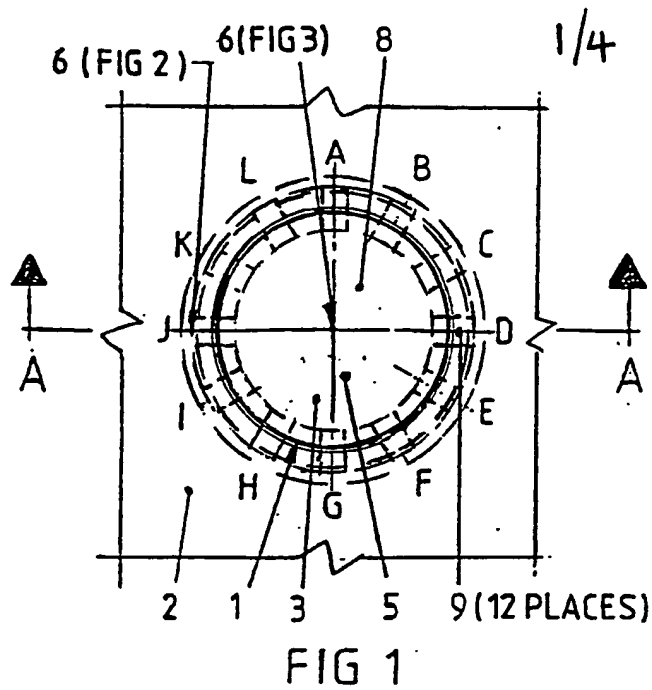
(58) Field of search

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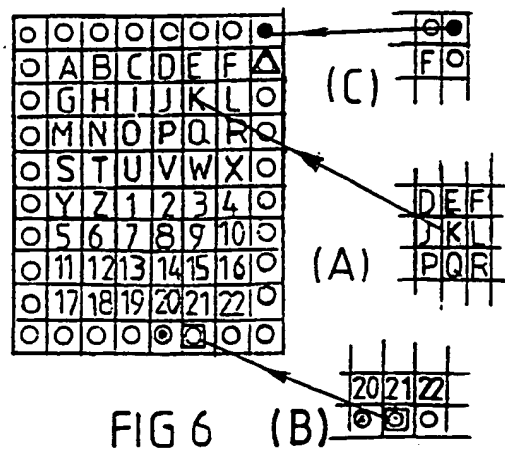
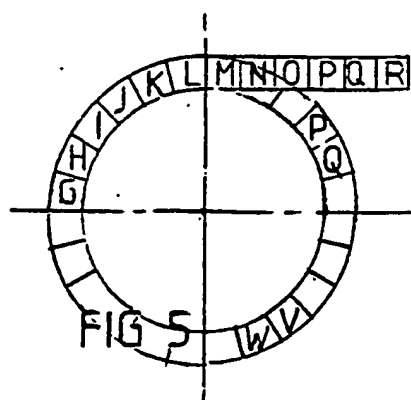
(54) Multiple electronic control switch assembly

(57) This invention relates to integrated multiple electronic control switch assemblies for computer keyboards, videos, aircraft, industrial and many other applications which will make them more compact and in some instances easier to use than existing methods. The switch operating pad areas are deliberately positioned close to each other so that the switches immediately adjacent to that being used are enclosed within the operator's finger print area where a pre-determined number of these must also transmit their signals to an integrated control circuit assembly in order that the required signal from the keypad located central to the fingerprint area is transmitted out of the assembly to its required destination.

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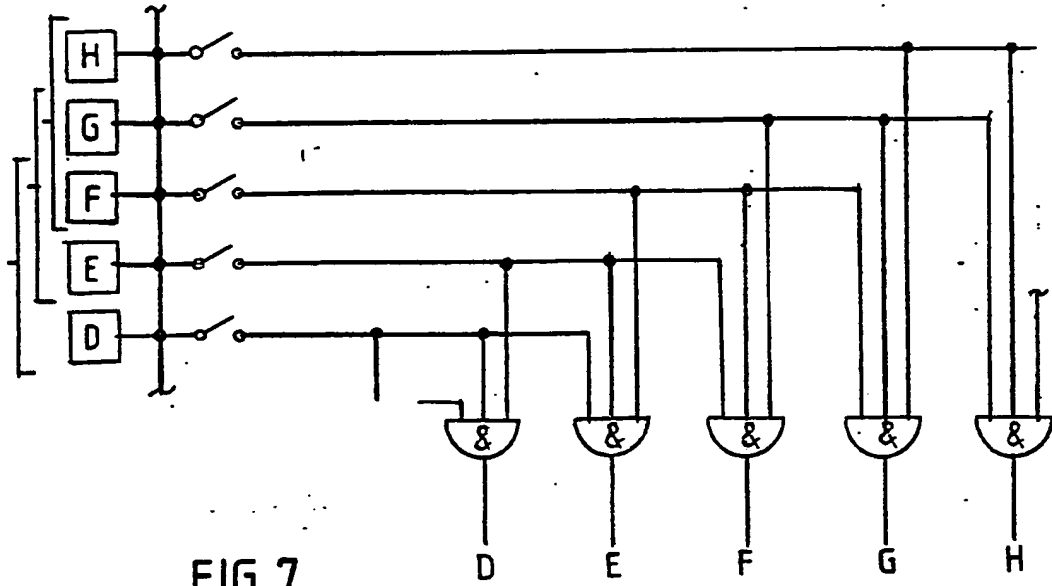


FIG 7

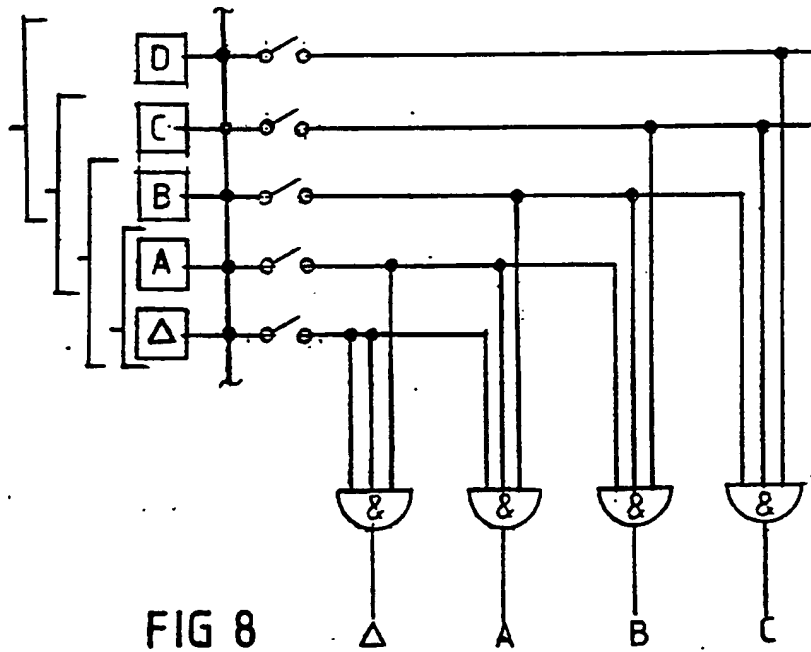
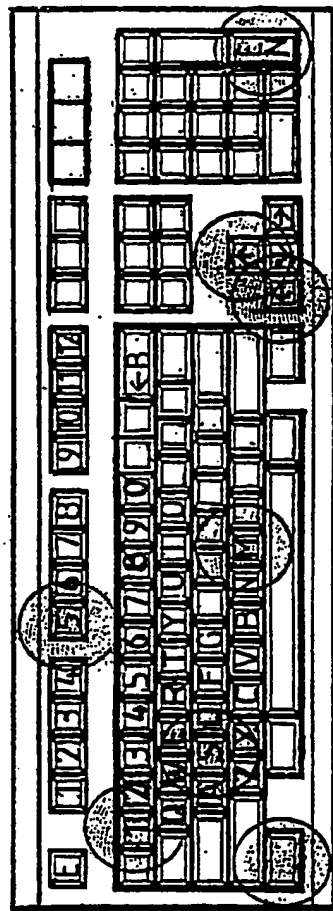
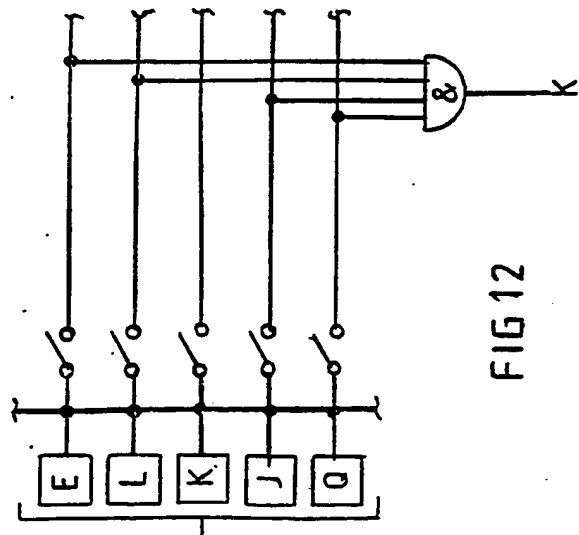
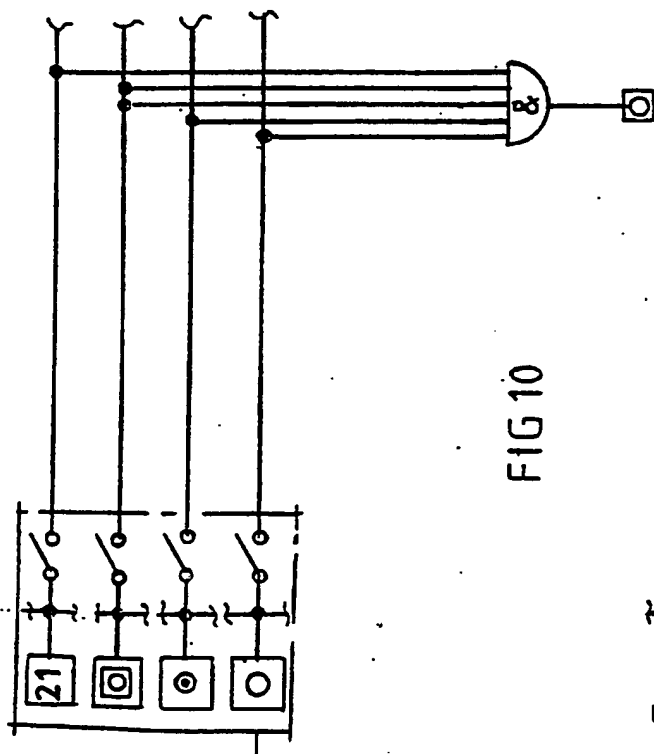
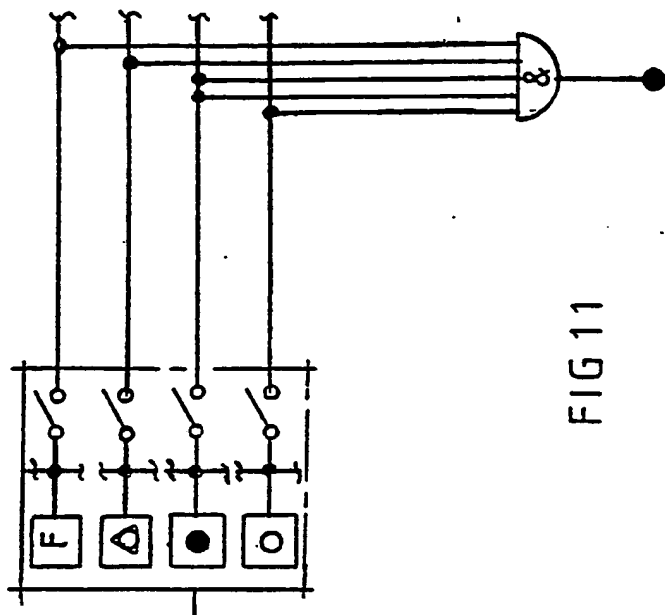


FIG 8





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1.

Improved Multiple Electronic Control Switch Assembly.

This invention relates to a manually operated integrated multiple electronic control switch assembly which can be operated more easily and occupies a smaller area than that of existing assemblies containing the equivalent number of keypads.

The spacing of keypads on existing control assemblies is such that there is sufficient space between them in order that when a keypad is pressed an adjacent keypad is not also accidentally pressed.

The spacing being governed to a certain extent by the area covered by a fingerprint.

With the proposed method the keypads are deliberately positioned sufficiently close to each other so that the keypads immediately adjacent to the keypad which is pressed are also covered by the operators fingerprint and pressed resulting in all the electrical signals of the pads pressed by the fingerprint going to an integrated circuit assembly where the signals are processed via an appropriate logic gate assembly complete with required associated equipment in such a manner that only the signal from the required switch is conducted to its required destination.

This method would enable the size of an assembly to be considerably reduced and in some circumstances would also enable the keyboard to be operated more efficiently.

The required integrated circuit design would be based on the appropriate truth table derived from the required logic where the output from the activated logic gates circuit is designed ( together with other components as required ) to perform the required functions which may be to toggle switches for on/off functions or to perform a continuous, intermittent or some other required control function.

Switch Assembly And Operation. See Fig Nos. 1, 2, 3, 4 And 7.

The assembly is constructed with a switch operating pressure pad which pivots about a fulcrum point or a suitably shaped surface under, suitably located relative to the switch operating positions around the pressure pad so that when pressure is applied at the required switch or control position on the periphery of the pressure pad, the pad pivots about the fulcrum and moves the switch position towards the surface beneath . This movement causes electric conductors to come into contact with each other thus completing the electric circuits to the input side of a suitable integrated circuit assembly as described above. When the pressure is removed from the pad it returns to its original position this being caused by the reactive force exerted by compressed suitably shaped spring, gas, rubber, foam or other suitable compressed elasticated material(s) located between the pad and the base thus opening the contacts and switching off the current to the integrated circuit assembly. The assembly can be constructed as a separate self contained unit with suitable attachment facilities or may be integral with and form part of a larger assembly.

2.

The switch operating pressure pad can be in the shape of a circular disc or a regular or an irregular shaped polygon or some other shape to suit. The pressure pad assembly could be constructed so that when the centre of the pad is pressed all, or a number of switch circuits are operated when switching on or off. This would be achieved by having a central spring loaded pivot point assembly which allows the pressure pad assembly together with the pivot under to move allowing all of the contacts meet and to complete all of the electric circuits.

Fig 5. Shows the keypads located in the shape of a strip which can be straight, curved in an arc, circle or some other shape.

When a keypad is pressed the keypad at each side is also pressed thus completing the required electric circuit from all three keypads to integrated circuit assembly, see Fig 7.

When the keypad located at the end of a strip is pressed the keypad at one side only is also pressed thus completing the required electric circuit from two keypads to the integrated circuit assembly see Fig 8.

Fig 6. Shows an example of a control panel consisting of 64 keypads.

When keypad 'K' surrounded by keypads on all sides is pressed together with the adjacent keypads, four ( or as required ) of these adjacent pads together with 'K' complete the electric circuits required to operate that switch. See Fig 9.

When a keypad located along the periphery is pressed together with the adjacent keypads, two or three of these adjacent keypads ( as required ) complete the electric circuits required to operate that switch. See Figs 10 and 11.

It may be more effective to have the adjacent keypads only to the one being operated, complete the electric circuits required to operate the logic gate switch assembly and transmit the required signal as shown in Fig 12.

The logic gate circuits shown are examples only, there being other types of logic gate, combination and different circuit designs which would perform the required functions based on the principles described.

The number and positions of adjacent keypads required to be used for the most efficient system would be empirical and subject to tests when the control circuit would be made to suit.

The keypads can be touch operated, the circuit connectors, breakers and associated equipment solid state, or by any other method or combination to suit the particular requirements of any of the switch and or control assemblies described, using present day state of the art technology.

With the switch/control methods described it would be advantageous to use them in conjunction with any portable electronic equipment where space, weight and simple compact controls are of prime consideration such as the keyboard for a computer or video camera for example. This method could be used in conjunction with relay switches for lighting purposes, also aircraft, ship, vehicle, industrial, robotic controls.

FIG NUMBERS AND DESCRIPTIONS.

Fig No.1. Plan view of an electro-mechanical multiple switch pad assembly with switch positions marked in alphabetical order.

2. Section of typical electro-mechanical switch pad assembly where switch pad 1, pivots about point 6, which is on the opposite side to that of the switch position.

3. Section of typical electro-mechanical switch pad assembly where switch pad 1, pivots about point 6, which is located central to the pad.

4. Typical examples of four regular polygon shaped multiple switch pads for electro-mech assembly or reduce in size for fingerprint pressure or touch operated pads.

5. Strip shaped multiple keypad assembly which has two operating conditions with one adjacent keypad ( at the end of the strip) or two adjacent pads to the one being operated also pressed. This strip may also be in the shape of a segment or complete circle, ellipse or some other polygon or other shape to suit.

6. Keypads mounted on panel showing three operating conditions, (A) central area, (B) corner area and (C) along edge, where the adjacent keypads to the one being operated is also pressed.

7. Example of a logic gate circuit which could be used with Figs 1 to 4, where three electric signals are required for that gate to open and transmit the required control signal.

8. Example of a logic gate circuit which could be used with Fig 5, where each gate requires three electric signals for that gate to open and transmit the required control signal.

9. Example of a logic gate circuit which could be used with Fig 6 (A) and Fig 13, where each gate requires electric signals from five keypads for that gate to transmit the required control signal.

10. Example of a logic gate circuit which could be used with Fig 6 (B) and Fig 13.

11. Example of a logic gate circuit which could be used with Fig 6 (C) and Fig 13.

12. Example of a logic gate circuit which could be used where the required signal is activated by the adjacent keypads only which could be used with Fig 6 and Fig 13.

13. Example of a computer keyboard of reduced size showing approximate finger pressure areas.

PART NUMBERS AND DESCRIPTIONS OF FIGS 1, 2 & 3 (ELECTRO-MECH. SWITCH)

1. Switch Pad.
2. Outer Casing.
3. Compressed Spring Or Other Material Or Gas.
4. Circuit Contact Assembly.
5. Integrated Control Circuit Assembly.
6. Fulcrum Or Pivot Point.
7. Retaining Plate.
8. Current Conductor From Supply.
9. Current Conductors To Part Number 5.
10. Control Signals Out From Part Number 5.



Examples where this invention could be used:-

Keyboards for compact computers and word processors where the size would be reduced to that where the symbols are legible and the operators fingerprint area covers the required number of key pads as shown in Fig 13.

This example shows a computer keyboard which measures 13cm x 4cm together with the operators fingerprint areas and number of keypads enclosed within these areas.

The principle of operation is the same as that shown in Figs 6, 9, 10, 11 and 12 together with the descriptions except for the number of keypads, symbols and there disposition.

It will be seen in Fig 13 that the keypads are large enough to contain legible symbols within the 3mm square areas of the keypad and small enough for the operators fingerprint to cover the required number of keypads. Where there is more than one symbol required to identify a keypad the extra symbol(s) can be accommodated adjacent to the keypad in question where required.

Controls for video and other electronic equipment could be as shown in Fig 1 to 6 (and description) or some other shape where a multiple switch pad or strip is suitably positioned on the equipment so that by pressing the centre of the pad the equipment is switched on and off (for instance) and by pressing the switch positions (complete with pips profiled as required) along the periphery of the pad other functions are controlled as previously described. Depending upon the number of functions, all or most of the control functions required could be performed by one multiple switch pad for instance on a video camera.

Controls for lighting where a large number of electric lights could be controlled from one switch assembly in conjunction with relay switches using established circuit design principles.

Aircraft control and services where due to the compact control areas possible with this invention flying controls would occupy a small area on the top of a static control column whilst associated controls and services could also be contained on the same, similar and or other location.

Conclusion.

Provided that this method of reducing the size of hand operated digital control equipment proves to be reliable and user friendly then this would mean that the portable telephone, facsimile machine, television, radio transmitter, receiver, calculator and many other items of control equipment could use this invention in there design where reduction in weight and size is an advantage.

CLAIMS.

1. A multiple electronic control switch assembly in which the keypads are deliberately positioned close to each other so that the operators finger print area encompasses and touches the adjacent keypads around the selected keypad so that they are also pressed.
2. A multiple electronic control switch assembly as claimed in Claim 1 wherein all of the electric signals from each of the keypads pressed inside the fingerprint area are required to activate the selected keypad at the centre of the fingerprint area and are transmitted to an integrated circuit assembly.
3. A multiple electronic control switch assembly as claimed in Claim 1 wherein a predetermined number of the electric signals from the pads pressed by the fingerprint area are required to activate the selected keypad at the centre of the finger print area and transmitted to an integrated circuit assembly.
4. A multiple electronic control switch assembly as claimed in any preceding claim wherein the electric signals are processed via an appropriate logic gate assembly complete with required associated equipment in such a manner that only the electric signal from one keypad switch ( or more if required ) is transmitted out of the integrated circuit assembly to its ( or there ) required destination.
5. A multiple electronic control switch assembly as claimed in any preceding claim wherein the integrated circuits, logic gate network and truth table which will allow only the required electric signals to pass through the assembly can be constructed using different combinations of components, gate types, logic networks and associated circuits to achieve the required results and can therefore be constructed in a variety of ways.
6. A multiple electronic control switch assembly as claimed in any preceding claim wherein the size and weight of a keyboard or any other control surface assembly would be reduced using this invention.
7. A multiple electronic control switch assembly as claimed in any preceding claim wherein this control assembly is not restricted in shape and may be in the form of a strip or pad of shape and size to suit the required control functions and/or product to which it attached or is integral with.
8. A multiple electronic control switch assembly as claimed in any preceding claim wherein the keyboard used on a computer, typewriter or any touch operated control panel can be reduced in size and is restricted only by the size and legibility of the symbols on or for each of the keypads.
9. A multiple electronic control switch assembly as claimed in any preceding claim wherein all or most of the controls on a video camera and other equipment portable or otherwise requiring electronic controls can be operated by at least one control pad assembly of suitable size and shape.

CLAIMS.

10. A multiple electronic control switch assembly as claimed in any preceding claim wherein the electric circuit from each key pad to the integrated circuit is completed using proven state of the art technology methods including touch only or movement of pad.

11. A multiple electronic control switch assembly as claimed in any preceding claim wherein the construction and design of the integrated circuit required to perform the functions created by this invention is constructed using proven state of the art technology.

12. A multiple electronic control switch assembly substantially as described herein with reference to Figures 1 - 13 of the accompanying drawings.

Patents Act 1977

Examiner's report to the Comptroller under  
Section 17 (The Search Report)

Application number

9205818.9

Relevant Technical fields

(i) UK CI (Edition K ) G4H (HKV, HKS, HKM, HKH)

(ii) Int CL (Edition 5 ) H03M, H03K, G06F

Search Examiner

M J DAVIS

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

30 APRIL 1992

Documents considered relevant following a search in respect of claims

1-12

| Category<br>(see over) | Identity of document and relevant passages  | Relevant to<br>claim(s) |
|------------------------|---|-------------------------|
| X                      | GB 2125199 A (SHARP) Whole document eg<br>figure 2(1) and page 3<br>lines 84-96   | 1-12                    |
| X                      | GB 2033632 A (SECRETARY OF STATE) Whole<br>document, eg abstract  | 1-12                    |
| X                      | GB 2022264 A (GENERAL ELECTRIC) Whole<br>document   | 1-12                    |
| X                      | GB 1492538 (LOUGHBOROUGH CONSULTANTS) Whole<br>document, eg figure 1 <i>page 1</i><br>lines 23-28 and page 4<br>lines 102-105 | 1-12                    |
| X                      | US 4745396 (REBER) Whole document   | 1-12                    |
| X                      | US 4242676 (PIGUET) Whole document eg<br>column 1 lines 6-19, column 3<br>lines 36-66 and column 4<br>lines 24-32             | 1-12                    |

| Category | Identity of document and relevant passages | Relevant to claim(s) |
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